Anita Satia
Director

State Council of Educational Research and Training
(An Autonomous Organisation of GNCT of Delhi)
Varun Marg, Defence Colony, New Delhi - 110024
Tel. : 91.11.24331356, Fax: +91.11.24332426
E-mail : dir12scert@gmail.com

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FOREWORD

(ANITA SATIA)
DIRECTOR

Delhi
Changing Climate

State Council of Educational Research & Training

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Chief Advisor
Ms. Anita Satia, Director, SCERT

Advisor
Dr. Pratibha Sharma, Joint Director, SCERT

Subject Expert and Coordinator
Dr. Rajender Kumar, Lecturer, SCERT

Vetting by
Dr. Majhar Ali Khan
Dr. Kumkum Srivastava

Writers

Dr. N. P Singh Dr. Ali Mohammad
Dr. Sumail Singh Ms. Manjistha Bose Dr. A.K. Khanna Ms. Vandana Gautam Dr. Rita Devi Ms. Sarawati Narayan Ms. Pushpa Tripathi Mr. Kanhaiya Jha Diwana Ms. Shabana

Publication Incharge
Ms. Sapna Yadav

Publication Team
Sh. Navin Kumar, Radha
and Jai Bhagwan

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FOREWORD

(ANITA SATIA)
DIRECTOR

Delhi is the heart of India and any work on Delhi, be it history, monuments, landscape, politics, society, economy, its trees and gardens, its language and environs, elicit tremendous, enthusiastic and eager responses from everyone in and outside Delhi. This book "Delhi - Changing Climate" will be a welcome addition to our interest in Delhi our beloved city.

The successful launch of "Meri Delhi, Badle Mausam" in Hindi initiated demands from many quarters for its English version. After the 2011 census numerous demo-graphic changes were reported also visible rapid changes in Delhi's landscape. It therefore became essential to incorporate all these changes.

I take immense pleasure in presenting this book to our young readers and hope that they will find interesting, educative and useful information about their city. I also feel that the book will be treasured by both students and teachers alike. We welcome your valuable suggestions and comments as they will help us improve the next edi-tion.

I congratulate the writers and the coordinating team for their efforts in undertaking and completion of this onerous task.

PREFACE

We at SCERT feel proud to sensitize Delhi inhabitants about the natural environment of Delhi through this book so that they are able to contribute reasonability towards its environment. Natural environment is a heritage that needs to be conserved for passing it on to the future generations in an enriched manner. We hope to reach out to the citizens of Delhi, sensitize them through our children towards behaving responsibility towards their own city. For quality development in school education the council undertakes counseling for various institutions, policy makers etc besides publishing study material. In this way the council has tried to reach out the citizens of Delhi in one way or the other.

There has been a heightened concern worldwide for the deteriorating condition of the environment. It is a dream of all to see Delhi evolve as a global city. How this is achievable is a big question. The council has put forward a small step in this direction by bringing about this new version of a "Delhi - Changing Climate" in your hands.

Delhi is a unique blend of antiquity and modernity. Many legacies have been lost but we have discovered new resource house too. We at

SCERT have put a small step forward by acquiring and sensitizing our young readers with their capital city.

I feel immense pleasure in dedicating this supplementary reading book to Delhi's inhabitants in general and in particular to people concerned with education.

I acknowledge the sincere efforts of the writers and staff of SCERT for providing such an interesting and thought provoking reading material.

(DR. PRATIBHA SHARMA)
JOINT DIRECTOR
SCERT

INTRODUCTION

Aim of education is not merely transfer of information but to generate curiosity by providing opportunities for contemplation and wonder, discussion and activities requiring hands on experience. Text-books are of course mandatory, but there is dearth of supplementary reading material that one can relish. This book is an attempt to fill this gap. The aim is that children should read it with interest and at the same time it should generate creativity, initiative and desire for further knowledge is generated, Delhi belongs to all of us. This heritage metropolitan city has been the capital of our country for centuries together. Keeping all this in mind, I am pleased to announce the release of the book "Delhi – Changing Climate" its beauty, diversity, along with the amenities are preserved and maintained, is the collective responsibility of all of us.

The climate of Delhi has changed with the passage of time and what we the inhabitants of Delhi do will have long term repercussions on its present and future. This has been an issue of debate both within and outside schools.

There is an urgent need to join hands and work collectively towards meeting the challenge of raising it to the levels of a global city and a model city in its natural setting. It is mandatory to develop an approach attitude in the future citizens of this unique metropolis to help it attain the status of a world class city.

(DR. RAJENDER KUMAR)
LECTURER, SCERT

CONTENTS

DELHI: CHANGING FACE OF ENVIRONMENT AND

CLIMATE

—A historical Perspective

Students were visibly excited as the school reopened in July after the long summer vacation came to an end. All of them were eager to share their experiences with Rajeshwarji. Rajeshwarji was very dear to all the children. They loved him. He taught his pupils in a manner that they were able to learn very fast and at the same time got curious to know more about the subject.

This time Rajeshwarji had asked them to collect information about all the places they visited during the vacation and write them in a sequence.

Apoorva was the first one to raise her hand and before she got the permission to answer, she shouted "Sir, should I tell?….."

Rajeshwarji tried to calm all of them and while doing so he said "I will listen to all of you, but, first, we will have to decide a sequence in which you will answer. The child who went to northern India shall narrate his experience first."

Abdul was happy. "Sir, I went to Kullu Manali along with my uncle. The place is amazing. There are huge mountains and weather is extremely cold." Abdul went on and on, it was hard to stop him now. Finally the teacher had to interrupt. He said, "Ok children, tomorrow get your experience in writing so that all of us would get to know about it.

Amongst all of them Gurmeet, Krishna and Soni sat silently. Rajeshwarji noticed that they were trying to speak something but were hesitating. So, he encouraged them to speak.

Gurmeet said "Sir, we did not go anywhere in these summer vacations. Thus, we collected information on our own city, Delhi".

"Now, that's great. Its good to first explore and know about our own city. Please share with everybody the information that you have collected. Gurmeet took out his report and started reading".

"Delhi is our capital city, it's total area is 1483 sq kms. Its position is 28.38° N latitude and 77.13° longitude. It lies 293 metres above the sea level."

"Krishna would read the rest of the report as he has gathered the remaining information." Krishna who was eagerly waiting for his turn started speaking: "Sir, the total population of Delhi is about 1.67 crores as per the 2011 census. There are 89.76 lakhs men and 77.76 lakh women which implies that the sex ratio is 1000:866. The density of population is 11297 people per square km. The literacy rate is 86.34% (according to 2001 census). The main languages spoken here are Hindi, Punjabi, Urdu and English. People of various faiths co-exist in complete harmony."

Before Rajeshwarji could comment, Soni raised her hand and said. "Sir, its my turn now."

Soni tried to make her voice as dramtaic as that of a T.V. news reader and started speaking, "The STD code of Delhi is 011, postal code is 1100 and vehicle code is DL-OXX."

The oldest literary record about Indraprastha

Mahabharta records that Khandor forest was given by Duryodhana to the Pandavas. Arjuna helped by lord Krishna, set the forest on fire and leveled the ground to lay out Indraprastha, it being the grandest of the five townships established by the Pandavas.

An inscription about Delhi

A slab of sandstone from the reign of Emperor Ashoka inscribes that 'Delhi was on the great northern highway of the Mauryas. Linking their capital, Patliputra with Taxila, it was the route usually undertaken by Buddhist monks for going to Central Asia.

Pre-Urban Settlements of Delhi

Village Anangpur around Badarpur hills is an important stone age site from where thousands of palaeolithic tools have been found (As revealed by excavations done here in 1990's) Late Harappan remains (2000 BC-1000 B.C. in Delhi)

– Late Harappan thick red pottery and graves found in Bhorgarh, a village near Narela.

- Mandoli in east Delhi had fairly small settlements from late Harappan phase till 4th - 5th Cent. AD.
- From Kharkhari Nehar, a village near Najafgarh, late Harappan pottery has been excavated.

An Ashokan rock edict on Raja Dhir Singh Marg near ISKCON temple in East of Kailash, Delhi, mentions that the emperor asserted his people to follow Dhamma.

Brilliant ! Rajeshwarji applauded and entire class echoed with the sound of clapping. Apoorva said, "Sir there is so much to know about each city, isn't it?"

Biodiversity is the extent & variety of plants and animals that are found in an area.

Taking a clue from what Apporva had said, Rajeshwarji continued, “Yes, so many things such as, how was the city a few centuries ago? How different is it now? What about climate, vegetation and the structure of the soil and boidiversity of the city? What about people? Which occupations do they engage in? and so on. But, first, all of you tell me, which month of the year is this?”

“July”, all the children shouted together.

“Ok, and how is the weather in the month of July?” Marry replied, “It’s hot and sometimes it rains too.”

“My granny told me that earlier it used to rain heavily in the month of July-August.” Said Rahul. “But, now, it rains less and the weather is even more hot, Isn’t it Rahul?” said Rajeshwarji.”

“Yes, Sir, sometimes the entire month of Shravan known for heavy rains, departs without even a single drop of rain.” said Gurmeet.

“Why is this happening and which milestones have been crossed to reach the present stage, we shall discuss all this tomorrow.” said Rajeshwarji.

The seeds of doubts and worries had already been sown in the fertile and curious minds of the young children. Rajeshwarji knew that next day there would be a rich harvest of questions. The period was over now and he left the class.

The next day Rajeshwarji was ready to face the barrage of questions that were going to come his way. As soon as the formal morning greetings were over, Abdul fixed the first question “Sir, yersterday you mentioned that Delhi’s climate has changed over the years.”

“Sir, I know that new events change history, but, do the geographical conditions too undergo changes?” asked Gurmeet.

“Yes, children,with the passage of time geographical landscape of a region too undergoes some changes. When these changes occur, naturally, its impact is not visible to one generation. For example, the formation of plain. Such changes happen extremely fast in exceptional circumstances only. For *e.g.* when an earthquake comes, or a volcano errupts, everything changes at the blink of an eyelid. However it is humans and their activites that are responsible for these changes. It has a longterm impact on various facets of geographical landscape and climate of the region.” Rajeshwarji was serious as he responded.

“Sir, What exactly does geographical landscape mean?” asked Soni. “It means the soil and its structure, vegetation and climate of a region.” “So, has it not always been like this?” Apoorva got serious.

“No, many things have changed from the ancient times till now. If we go through the pages of history and ancient anecdotes, we shall get a glimpse of Delhi’s rich boidiversity and environment. Ok, now tell me, who all know about the battle of Mahabarata?

Many hands got raised.

“We have watched the whole of the Mahabharata serial on the television, recalled Sudeepta.

Rajeshwarji tried to establish links “ so can you recall that during that period Pandavas had established their kingdom in the barren lands of Delhi and named the city Indraprastha. This was the first human invasion into the natural forests of Delhi.”

This is an ancient pauranic tale, but, over a period of time Delhi was ruled by many kings. They tried to govern the city in their own manner, and with each ruler new chapters were added to the history of Delhi. The natural vegetation got replaced by the buildings and deforestation increased. The teacher continued, “Delhi used to be a green city, the region between south west Cant area and the Delhi university is the area of Aravalli foothills. This mountaneous region had a thick forest cover, but, with the coming of new rulers and the consequent construction of forts and other buildings the forests started depleting and are today on the verge of extinction.

“Sir, in this sequence, who was the first ruler associated with the urbanisation of the city?”

Rajeshwarji appreciated the question and replied “According to the historical evidences Anangpal Tomar built a city called Lalkot here. This was possibly the region around the present day Mehrauli.

After the Tomars, Prithviraj Chauhan became the ruler of Delhi and he constructed the fort of Kila-i-Rai Pithaura.”

“And then, once again jungles would have been cut.” Krishna was upset.

“Yes, but, certainly it was important for the rulers to build forts then. To protect the State from the intrusion and attack of the enemy, the rulers used to construct forts.

But, at the same time, they understood their responsibilty to plant trees, build more bawalis and wells.

Marry asked, “Sir, wasn’t there any pollution then?”

Rajeshwarji smiled, “Marry during those times petrol and diesel were not in use. There were no modern machines and hence natural resources could not be exploited. Population was low and so were the needs of the people, hence, there was no problem of pollution.

Abdul was still thinking about the rulers who constructed the city of Delhi. He requested, “Sir, you were telling us about Prithviraj Chauhan and the fort he got constructed, who came next?”

“Next, in 1191 Mohammad Ghori attacked and captured the city of Delhi. He handed over the rule of Delhi to his trusted slave Qutubuddin Aibak. Many rulers came after that and each left his imprint on the city of Delhi.”

Apoorva said, “Qutubuddin Aibak reminds me of the Qutubminar in Delhi.”

“Yes, It was built by him. He also developed the area around Mehrauli. At that time this region was covered by lush green forests. The water used to flow in this region via the Hauz-i-Shamsi canal which was built by Iltutmish. But sadly it has no water now.

After that Delhi was ruled by a series of rulers from Razia Sultan to Aluddin Khilji. Alauddin Khalji built the Siri fort in the area of present day Malviya Nagar. To meet the requirement of water he also built the Ilahi Hauz near the Hauz Khaz region. Rajeshwarji stopped speaking. The students were however in no mood to stop. Even Sarala, who was usually silent, suddenly spoke, “what happened then, Sir?”

Rajeshwarji knew that he had to narrate the whole story now - “it seems that you all want to know the story of the city of Delhi.”

Tughlaqs came next after the Khaljis. In 1320 Ghiyasuddin Tughlaq developed the mountaneous region between Mehrauli and Dadarpur and named it Tughlakabad. The forests and mountains were cut to construct the fort of Tughlakabad. Around the fort were built mosques and other buildings useful to the general population. The surrounding mountains and forests got destroyed in the process.

Muhammad Tughlaq shifted the capital from Delhi to Daulatabad. One of the reason cited was that the scarcity of water was being desperately felt by the people of Delhi. Sudipta quipped, “Sir, if they felt scarcity of water, they could have shifted near the banks of river Yamuna instead of shifting to Daulatabad”.

You are right, this was precisely the reason why Firozashah Tughlaq built the city of Firozabad (Firoz Shah Kotla) near the banks of river Yamuna. He also built high walls, palaces, mosques and high platforms for hunting activities all around the region during his reign.”

Soni was surprised-“Sir, platform for hunting? Were there any wild animals in the forests of Delhi then”?

Rajeshwarji elaborated “Yes, then, a big part of Delhi was covered by thick forests. Aravalli mountains extended upto Delhi and these mountain ranges had thick forest cover.”

“Even today, places such as Paharganj, Anand Parvat, Raysina Hills (as their names suggest) attest to the fact that these were hilly areas once upon a time. Due to increasing human intervention and constantly reducing forests cover, the wild animals too decreased in number and are almost on the verge of extinction now.”

Rajeshwarji carried forward the story of constrution of the city of Delhi and the subsequent destruction of forests. After the Tughlaqs followed the rule of the Saiyyads and the Lodis. But, no major construction took place during their tenure.

Gurmeet put up another question-“Sir who ruled over Delhi for the longest period?”

Rajeshwarji felt that though curious, the children were feeling tired by now. He promised to continue with the rest of the story the next day and left the classroom.

The next day, before he begun his discussion, Rajeshwarji, hung a wall map related to medieval Indian history in the classroom.

He said, “if given a chance to decide about the capital of this country, which place would you choose?” Soni stood up and pointed towards the centre of the map. The teacher was pleased. “Absolutely right Soni ! I think you chose this place because it is located in the centre. Delhi was so located and because of this reason it was chosen as the capital city by most of the rulers. Delhi was the capital city under most of the rulers, so it attracted people from all parts of the country who migrated and settled here. The process continues till date and the large hearted city has accomodated many migrants from various parts of the country.”

“Sir, today you were supposed to tell us about who proceeded the Lodi dynasty in Delhi.” Gurmeet tried to divert the attention of Rajeshwarji.

Rajeshwarji laughed, “Oh, I was just coming to it. Babur defeated Ibrahim Lodi in 1526 AD and laid the foundation of the Mughal empire in India. According to the historians Babur did not like the climate of India. Thus, he showed little interest in any construction work in Delhi. But, later on, his son Humayun built the city of “Dinpanah” as his capital city near the site of the present day Purana Quila.

Later on Shershah Suri followed by Humayun again made it the centre of royal power. Its remains are a testimony to the glorious saga of the by gone era. It is surrounded by a thick cover of forests even now. Similarly, Shahjahan built the grand Red Fort later on." "The same place from where our prime minister unfurls the national tricolor every year", said Apoorva.

"Yes, the same Red fort was the centre of political activities of emperor Shahjahan in seventeenth century.

Shahjahan built the city of Shahjahanabad on the banks of river Yamuna. It was surrounded from all four sides by huge walls and hence it was also called the "walled city". Huge gates were constructed to enter the city. Can you name some of them?"

Abdul raised his hand immediately and spoke "Sir, they are Dilli Gate, Kabuli Gate, Kashmiri Gate, Mori Gate, Lahori Gate and Ajmeri Gate.

Turkman gate was before the Mughals," Absolutely right, once again the natural landscape of Delhi was effected by all this construction work. Once again Delhi lost its greenery due to urbanisation. Of course the Mughals planted trees and built gardens in the premises of Redfort to compensate for the loss.

The process, however continued unabated." "What does this mean sir?" Gurmeet was excited.

The British succeeded the Mughals in Delhi. The changing times and demands of administration once again called for changes. In 1911 they took the decision to make Delhi their capital instead of Calcutta. Post this, huge construction work commenced in the area around Raisina Hills which includes the buildings of Viceroy's lodge (Rashtrapati Bhawan), North Bock, South Block and other Government buildings. The construction work commenced under the guidance and supervision of the famous architect Edwin Lutyen. This is the reason why it is also called Lutyen's Zone. Thus, the newly constructed buildings and gardens replaced the natural forests.

Besides this, the process of converting the rural areas of Delhi into urban areas too begun under the British. For example in the village of Chandrawal in North Delhi there were eighteen wells and five ponds in the 19th century. In 1903 the Britishers acquired 187 acres of land from the farmers and the Metcalfe Residence was constructed in this area." Rajeshwarji stopped for a while.

"Sir, even now, new colonies are being constructed in Delhi. Does this too have an impact on the environment of the city?" asked Shaheen.

Rajeshwarji put up a question before replying to this.

"Which newly developed colony of Delhi are you talking about?"

"Colonies such as Dwarka, Rohini. Mayur Vihar and so on." Shaheen tried to recall.

And even before this, the busy residental areas such as Maharani Bagh, Shalimar Bagh, Pitampura, Vikaspuri, Janakpuri had dense forests and agricultural fields instead of huge bunglows and mulitstoreyed buildings. Similarly many residental areas such as Mayur Vihar, Kalyan Puri, Sarita Vihar and Dakshin Puri got inhabited. On one hand Delhi was getting settled and inhabited while on the other hand its natural resources were depleting. Delhi soon developed into a jungle of concrete while fresh air and water became scarce.

"What is the connection between establishment of residental colonies and fresh air and water?" asked Marry.

“Try to understand this in detail”. Rajeshwarji explained “Delhi is the capital of India. It is the centre of all political, cultural and educational activities. Also, it has recently developed into the centre for trading activities and small scale industries. It is also a popular tourist destination because of various sites of historical importance. The population pressure in Delhi has been increasing due to the above reasons. Owing to the increasing population pressure the forests which were a source of fresh air have depleted. On the other hand, because of large scale construction activities undertaken, the rain water fails to seep in the land, thus it adversely affects the level and quality of underground water.

“Also, Sir, increase in population means increase in pollution?”

“Yes, to cater to the needs of the growing population we have arranged for the transportation, power supply, sewage and so on. This not only affects the climate but also the environment.

“The smoke present in the air results in the rise of temperature in Delhi.” Rajeshwarji explained.

“Sometimes, it becomes difficult to differentiate between smoke and clouds in the sky,” said Gurmeet “Sir, Delhi is still expanding”. Lata tried to pick up the clue and said “Sir, we see that now a days in a large area of Delhi, unauthorised and illlegal colonies have cropped up.”

“Yes, these colonies are not expanded, thus, the needs of residents are not catered to and they also cause environmental pollution—said Rajeshwarji.

“Sir, we see that now a days the National capital territory region is being developed.” What is the objective behind this? asked Abdul.

Some of the areas of neighbouring regions of Delhi such as Uttar pradesh, Haryana, Punjab, Rajasthan have been grouped under the National Capital Territory and to reduce the pressure of population the residents of Delhi are being encouraged to shift here. To ensure this, these cities are being provided with many facilities and they are being connected to Delhi by the fastest means of transportation.

“This is indeed a commendable effort” said Lata. “Yes, development of the NCR region is a welcome step, but by now, it has been transformed in to natural form of Delhi. The emerging of new colonies in the western part of the ridge area adversely affect the natural drainage system of Delhi. For the development of new colonies the ridge area was cleared off by means of chemical explosions. At present, the remains of this ridge can be seen in four parts near Delhi University, near Dhaula Kuan and some of it in South Delhi. Sanjay Van, Buddha Jayanti Park and Mahavir Jayanti Park too are the parts of the ridge area. The natural flora and fauna of these regions have been destroyed due to human invasion” said Rajeshwarji.

“Sir, please take us to these areas for an excursion”. Apoorva said, “Ever since you discussed about these areas with us, we have been yearning to visit them.”

“Yes, we shall definitely go, but, first, let us know about another natural resource of Delhi” said Rajeshwarji.

“Another natural resource? Sir are you referring to river Yamuna?” Said Gurmeet, “Sir even river Yamuna has got extremely polluted.”

“Yes, you are right Gurmeet”, Rajeshwarji appreciated him and then continued “Besides pollution, there is another problem. Flood plains of river Yamuna have either been developed for residential purpose or have been encroached upon illegaly. This adversely affects the natural drainage system on one hand and causes pollution on the other hand”, explained Rajeshwarji.

Abdul was a bit disappointed, “ Sir can’t we do anything about it?”

“Its never too late to begin a noble cause” said Rajeshwarji, “Even now the ridge area of Delhi has natural flora and fauna.” We should honestly try to conserve them in their natural form. Yamuna river is our life line. We should make all possible efforts to make it pollution free. It’s river banks should be free from any kind of construction work.” To cleanse the river many efforts are being made now.

“Sir, We should also plant more and more trees”. Some of them spoke in a single voice.

“Absolutely, this is indeed very important, it will definitely lead to improvement in the quality of air in Delhi. All of you should try that none of the activities in your neighbouring and surrounding areas cause pollution. It is important to spread awareness if we have to keep our Delhi beautiful and pollution free and who can do it better than you, the pupil of our country?”

Rajeshwarji continued “It is very thoughtful to continue with the development work without disturbing our ecological balance. It can be a big challange. If we are not sensitive towards our mother earth then not only the large industrial units and construction companies but sometimes even a small pedlar can unknowingly cause immense harm to nature. By the time we become aware of it, its too late.”

Ain - i - Akbari by Abul Fazl records that in 1601 for most of the northern India the extent of cultivated area in Akbar’s time has been estimated at 50 to 55 % what it was in the first decade of 16 th century.

As compared to vegetation map of 1909 and report of Abul Fazl in 1601, during past three centuries cultivated area has been doubled against forest and waste and conspicuous disappearance of wild life.

“How, Sir?” asked Apoorva.

Earlier there used to be many Dhak trees in Delhi, the leaves of these trees were picked hugely as they could be used to make plates for street side vendors selling eateries. Slowly and gradually the Dhak trees vanished. How many Dhak trees can you see in Delhi these days? asked Rajeshwarji.

“Sir, now when we plant trees, we shall definitely plant more of Dhak trees”. said Abdul.

All the students collectively greeted their teacher as it was the end of the day. They wished him “good day” and a hopeful Rajeshwarji left the class anticipating a better future for Delhi’s enviornment.

Activity

A crossword is given below, Hidden in it are the names of some of the lakes, villages and areas of Delhi.
You can find them in a horizontal, vertical or diognal row. Find them and mark them with a pencil.

M	O	R	I	J	A	I	E	C	H	I
T	P	S	N	B	R	I	G	H	J	K
C		Y	A	M	U	N	A	A	L	M
L	H	I	N	B	C	D	J	N	O	N
A	S	A	A	D	F	R	I	D	G	E
L	I	H	N	E	G	A	K	R	L	M
Q	R	J	O	D	I	P	N	A	O	P
I	I	K	P	L	R	R	C	V	D	E
L	F	M	A	N	O	A	S	A	T	U
A	O	P	R	A	B	S	V	L	Y	Z
C	R	D	V	F	G	T	N	A	O	P
H	T	P	T	T	S	H	Q	R	L	S

Mango, Shisham and Banyan were the major trees planted during Mughal era in Delhi.

Britishers, while developing New Delhi as their imperial city followed a scheme of planting trees alongside the avenues. Trees chosen to be planted should be ones that do not grow too big to hide the architectural features of New Delhi — They should be evergreen

— To maintain cleanliness such trees which frequently shed their leaves and created leaf litter were avoided being planted.

— Trees to be planted were chosen from different parts of India instead of selecting only those which would naturaly grow in Delhi's ecosystem.

Exercise

1. A debate on deforstation Vs afforestation.
2. Which are the trees that have disappeared from Delhi?

Avenue Trees

Match the areas with the type of avenue trees grown :

	Area Road	*Avenue Trees*
1.	Akbar Road Tilak Road	Imli
2.	Ashok Road Rajpath	Jamun
3.	(i) Safdarjang Road (ii) Lodi Road (i) Aurangzeb Road (ii) Maulana Azad Road	Neem
4.	Janpath	Arjuna
5.	Mandir Marg and Panchshell Marg	Pipal
6.	South End Road	Kusum

Arjun, Imli, Baheda, Jamun, Neem contribute to 85% of the total avenue trees grown in New Delhi by the Britishers.

Jamun	Most common (Tughlak Road, Rajaji Road, Tyagraj Road)
Neem	(Safdarajang Road, Prithviraj Road, Ashok Road, Tees Janua Marg)

THE CHANGING WEATHER OF DELHI

It was about 11'o' clock on Monday, it was a bright sunny morning, weather was really pleasant. Students were busy with their studies in their respective classes. Suddenly, the sky became dark and dust laiden winds began to knock the windows of the rooms. The two near by street lights had become dim by now. Rajeshwarji asked Gurmeet to close the windows. Jacob asked his teacher, "Sir, the weather was pleasant in the morning, days were bright and sunny since last week, but it appears from the thundering and fierce winds that it will rain heavily today". Apoorva said, "the rains in summer are pleasant. If I would have been at home I would have merrily bathed in the rain water. But I am afraid of lightening and thunder. Abdul interrupted Apoorva and said, "Sir, what do you mean by weather?"

Rajeshwarji, replied, "When we reflect on the atmospheric conditions such as air temperature, air pressure, velocity of air, direction of winds, clouds, insolation, humidity, rains and so on of a specific place over a short period of time we are talking about the weather of that area."

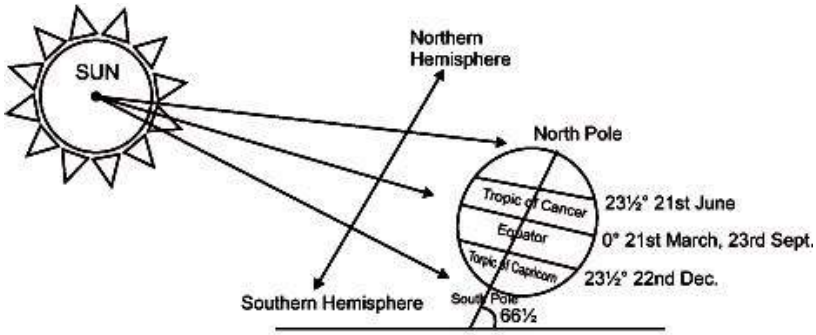
"Similarly, the average of the atmospheric condition of the same place over a longer period of time such as air temperature, air pressure, velocity of winds, direction of winds, clouds, insolation, humidity, rain and so on is called climate."

Rahul asked Rajeshwarji, "Sir, what is temperature?"

Rajeshwarji replied "Air temperature is the intensity of solar heat in the atmosphere. It is measured by means of a special instrument called thermometre".

Abdul asked Rajeshwarji, "Sun rises in both summers and winters but why do we feel cold in winter and hot in summer?

Rajeshwarji replied, "Abdul, Our earth is almost round in shape and is inclined on its axis at an angle of 23½° N. It revolves around the sun rotating on its axis. Due to this revolution northern and southern hemisphere get exposed to sun at different times. When the sun's rays fall on the northern hemisphere it is called Uttarayan, and when the southern hemisphere gets exposed to the sun it is called "Dakshinayan". Thus, the rays of sun are sometimes perpendiculer to the Norhtern hemisphere and sometimes to the Southern hemisphere. During Uttarayan the sun's rays fall perpendicularly in the Nothern hemisphere while during Dakhsinayan they fall perpendicularly in the southern hemisphere. More heat is generated when sun rays fall perpendicularly while less heat is generated when sun rays are inclined. India is located in the Northern hemisphere, hence during Uttarayan we have summer while in Dakshinayan we have winter. Thus, we feel hot in summer and cold in winter.



On hearing this, Gurmeet said, “Sir, I have noticed that days are longer in summer and nights shorter, while during winter the days are shorter and nights are longer.”

Apoorva was the next to ask, “Sir, when I went to my Granny’s place in Barmer during summer vacation, I found that the days were extremely hot, while nights were extremely cold there. Why so? To this Rajeshwarji replied “Rajasthan has very low vegetation, most of the land is dry and aried. During the day earth absorbs a lot of heat so days are hot.

Marry asked Rajeshwarji, “How do we measure temperature ?” Rajeshwarji replied “temperature is measured with the help of thermometre. This instrument is made up of a thin tube of glass with a narrow hole. The tube is filled with mercury. Now a days thermometres are also made up of red coloured alcohol.

When the air around us is hot, then the mercury or alcohol gets hot and rises up in the glass tube. When it is cold, the temperature falls down. The temperature at which the water freezes is called its freezing point and the temperature at which it boils it called its boiling point. The mark seales on the thermometre are indicated in celsius or Fahrenheits.

Changing Seasons

The four Cycle of Seasons

Winter (Sheet) — The most pleasant season in Delhi is in December & January. Icy winds are due to snowfall in mountains of Jammu and Kashmir and Himachal Pardesh.

Spring(Basant) — February & March, a pleasant season.

Summer(Grishma) — April to June, hot winds from desert lead to temperature soaring from 40°C, to 46°C. Hot & dry season. Violent dust laiden storms called loo (hot waves of wind) occur frequently.

Rain (Varsha) — July-August, onset of Monsoon.

(Post rain) — September-October, withdrawl of rainy season. Still high temperature upto 30°C.

(Early Winter) — October-November. Dry & pleasant.

In a Fahrenheit thermometre freezing point is 32°F and boiling point is 212°F, whereas in a centigrade thermometre freezing point is 0°C and boiling point is 100°C. Rahul who was listening to Rajeshwarji carefully asked “Sir, what is average temperature?” Rajeshwarji replied “Rahul, if we add the maximum and minimum temperature of a particular day and divide it by two we arrive at the average temperature of that day.” It can be calculated as follow:-

$$\text{Average daily temperature} = \frac{\text{Maximum Temperature + Minimum Temperature}}{2}$$

for eg $\frac{49°\,C + 21°C}{2}$ = 70/2 = 35°C.

Similarly, when we add the average daily temperature of all the days of a month of the year and divide it by total number of days in that month we arrive at the monthly average temperature.

Also, when we add the average monthly temperature of all the twelve months of the year and divide it by twelve we arrive at the average annual temperature.

Francois Bernier in his letter to Monsieur De La Mothe Le Vayer written from Delhi on 1st July 1663 writes about the climate of Delhi.

“I am sometimes astonished to hear the contemptuous manner in which Europeans in the Indis speak of these and other places. They complain that the builidings are inferior in beauty to those of the western world, forgetting that different climates require different styles of architecture, that what is useful and proper at Paris, London, or Amsterdam, would be entirely out of place at Delhi. Thus, Delhi also may boast of great beauties, adapted to a warm climate.

The heat is so intense in Hindustan that on one, not even the king wears stockings. The other garments are proportionately light. During the summer season, it is scarcely possible to keep the hand on the wall of an apartment, or the head on a pillow. For more than six successive months, everybody lies in the open air without covering……, absence of wind increases the heat almost to suffocation……..

suppose one just returned sutsloors on horseback, half dead with heat and dust, and drenched as usual in perspiration…. you have only to swallow quickly fresh water or lemonade, to undress, wash face, hands and feet, and then fan yourself with pankhas.”

Abdul interrupted in between “Sir can the difference in temperature be found out by substracting the minimum temperature from the maximum temperature “Yes, replied Rajeswarji, “The difference between the maximum and minimum temperature of a particular place is called its daily range of temperature.”

“Similarly if we find out the difference between the temperature of the hottest and coldest months of the year we arrive at the annual range of temperature.”

It was Raghav’s turn now. He asked, “Sir, what do we mean by air pressure”?

Rajeshwarji replied, “Air is present in the atmosphere which spreads thousands of kilometres above the earth’s surface surrounding it from all the sides.Like any other object, air too has weight and exerts pressure downwards. This is called air pressure or atmospheric pressure. The upper layers of the air exert pressure on the lower layers. Thus air pressure is more near the earth’s surface. Children, air pressure is about 1 kg per square centimetre at the surface of the ocean. But, as we go up, the air pressure decreases”.

Apoorva said, “In that case, Sir, air pressure would also be exerted on our bodies”. “Certainly”, said Rajeshwarji, “on the earth, about 112 kg of air pressure is over our heads, but we don’t feel it because all around us the air pressure is balanced. Jacob asked, “Sir, what is the relation between temperature and air pressure?”

Rajeshwarji replied, “Children, if the temperature of a place rises, the air becomes hot and consequently as it rises up and expands, the air pressure decreases, contrary to this, when the temperature decreases, the air becomes cold and contracts, thus, the air pressure increases. We come to a conclusion that when the temperature of an area increases, the air pressure decreases whereas when the temperature of an area decreases, the air pressure increases.

Gurmeet asked, “Sir, can air pressure too be measured?” Yes, replied Rajeshwarji “In the same way as we measure temperature, air pressure too can be measured by means of an instrument.”

Fortin Barometer and Aneroid Barometer

Fortin barometer was invented by a scientist named Fortin. A glass tube about 1 metre long is filled with mercury. The tube is closed at one end and the other end opens up in a vessel filled with mercury. The tube is marked with scales. On the surface of the ocean the height of the mercury of the barometre is 30 inches or 760 milimetres or 1000 milibars. The mercury rises or falls in accordance with the rise or fall in the air pressure. Similarly aneriod barometer is of the shape of a round metallic box. It has a spring inside. It is covered by a lid.

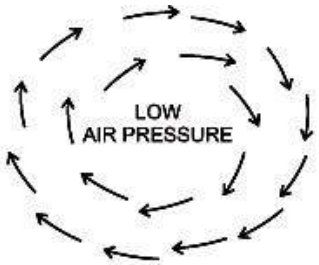
It has measures indicated on it. It is evacuated of all air. The lid has a pointer needle. When the pressure is exerted on the lid the needle starts to rotate and indicates the low or high air pressure.

Raghav asked his teacher, “Sir what happens when air pressure is high or low”?

Rajeshwarji replied, “Whenever because of high temperature the air becomes hot and light and rises up, the low air pressure developes over that area. Contrary to this, when the temperature of a place declines due to cold weather conditions, high air pressure is develped over that area. Thus the winds move from high pressure areas to low pressure areas. This is the normal movement of air. But, when because of some reason a low pressure develops in the middle of a place and it is, surrounded by high air pressure on all the sides, the winds keep on flowing towards low air pressure areas. These winds appear like a round pillar. These winds rotating in a circular path are called cyclones or anticyclones. They are called typhoon in China, tornadoes in America, hurricanes in Wertern islands. Sometimes these cyclones have a diametre ranging from 30 kms to 1000 kms. These cyclones are followed by dust, pieces of papers, along with lightening and heavy rainfall.

Apoorva interrupted in between “It is raining today, does this rainfall have any connection with the cyclones” Rajeshwarji replied, “Yes, these are symptoms of cyclones”.

Children these cyclones are very destructive. They destroy anything that comes their way. They damage human life and property. In the oceans these cyclones acquire dangerous form and cause immense damage to the ships in the coastal areas.



CYCLONE

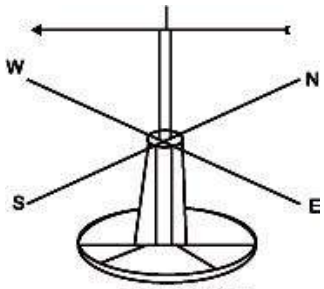
ANTI CYCLONE

But, in anticyclones winds are dry and calm. Thus, weather is pure and pleasant and clouds are not formed. Thus, there is low rainfall. Consequently these anticyclones make the summers of a particular place hotter and winters colder."

Aproova asked Rajeshwarji, "How do we determine the direction of the wind?"

Rajeshwarji replied, "There is an instrument through which we locate the direction of the wind, it is called wind wane. There is an arrow placed at it axis which easily rotates with the movement of the wind. Downwards, are located four pointers to point towards the four directions. The arrow points towards the direction in which the wind moves. Jacob asked his teacher "Sir , what do we mean by humidity of the air?"

Rajeshwarji replied, "In the atmosphere besides various kind of gases there are dust and vapour particles. The mass of vapour particles present in the air is called humidity".



WIND WANE

Rajeshwarji appreciated, "very good Apoorva, you are right. Humidity is more in summers and less in winters. This is the reason why our lips and feet develop cracks in winters".

Jackob asked, "Sir, from where does air acquire humidity?"